REMARKS

By this Amendment, Applicant has amended claims 1 and 4-14, cancelled claims 16 and 17, and added new claims 18-30. Claims 1, 2, 4-15 and 18-30 are pending.

Claim Rejections Under 35 U.S.C. Section 103

Claims 1, 2 and 4-17 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Iwasa, Shino, and Okuda. Based on this Amendment, Applicant respectfully traverses the Section 103(a).

Claims 1 and 5 are independent claims. Claims 2, 4, 11, 12 and 15 are dependent on claim 1. Claims 6-8, 9, 10, 13, and 14 are dependent on claim 5.

Turning first to independent claim 5, it is directed to a display device including the following elements:

- a plurality of cathode wires,
- a plurality of anode wires arranged in a matrix shape together with the plurality of cathode wires,
- electroluminscence (EL) elements disposed between the plurality of cathode wires and anode wires, and in which an electrical charge is stored,
- a current source coupled to the anode wires,
- a cathode source coupled to the cathode wires,
- an anode control circuit connected between the anode wires and the current source, for discharging the stored charge from the EL elements, and for controlling respective current flow into said anode wires,

- a cathode circuit connected between the cathode wires and the voltage source, for discharging the stored charge from the EL elements and for controlling respective voltages at the cathode wires,

- a display controller for controlling the anode control circuit and the cathode control circuit, the display controller, including **a setting unit for setting a discharge time for discharging the stored charge of the EL elements before light emission of the EL elements to a time Rt,**

- **wherein a discharge time Tx for discharging the stored charge before light emission of the EL elements is determined so as to obtain a luminance Lp of said EL elements determined by:**

- **$Lp \geq 0.9 \times Le$,**

- **where Le is a luminance of light emitted by the EL elements storing substantially no electrical charge and the discharge time Rt satisfies the relation of:**

  $Tx \leq Rt$.

Applicant respectfully submits that the display device defined by claim 1 is patentably distinguished from the Iwasa, Shino and Okuda Patents at least based on the requirement of the setting unit for setting a discharge time for discharging the stored charge of the EL elements before light emission of the EL elements to a time Rt, wherein a discharge time Tx for discharging the stored charge before light emission of the EL elements is determined so as to obtain a luminance Lp of the EL elements determined by: $Lp \geq 0.9 \chi Le$, where Le is a luminance of light emitted by said EL elements storing substantially no electrical charge, and the discharge time Rt satisfies the relation of: $Tx \leq Rt$ (hereinafter generally referred to as the "Setting Unit Feature" of Applicant's claimed invention). In other words, the

Setting Unit Feature is neither taught nor suggested in the Iwasa, Shino and Okuda Patents.

The Iwasa Patent concerns, in general, a two-dimensional surface light emitting laser array in which laser elements are arranged into two dimensions in an elongated region which is longer in the horizontal direction than in the vertical direction. Anode wiring extends in a direction inclined to the horizontal direction and cathode wiring extends in another direction inclined to the horizontal direction, so that the anode wiring and cathode wiring cross each other. The laser array has "n" laser elements arranged in a horizontal direction and "n" laser elements arranged in the vertical direction. The anodes of n laser elements arranged in the direction of the anode wiring are connected to an anode wire, while the cathodes of the n laser elements arranged in the cathode wiring are connected to the cathode wire.

But nowhere in the Iwasa Patent is there any teaching or suggestion for a setting unit for setting a discharge time as defined in Applicant's claim 1. In other words, the device array of Iwasa does not teach or suggest the Setting Unit Feature of Applicant's claimed invention. Applicant submits that this position is supported in the Office Action, which does not look to the Iwasa Patent for teaching or suggesting the Setting Unit Feature.

The Shino Patent, in general, relates to a method of driving a plasma display panel which includes electrodes and gas between the electrodes. The plasma display of Shino has a three-dimensional matrix wiring arrangement of anodes, cathodes and address electrodes. The Shino Patent has been cited with respect to Figures 1, 8 and 9, but it appears that Figure 6 is considered the most relevant Figure of the Shino Patent in the Office Action. Figure 6 shows a relationship between discharge current and luminescence and a relation between discharge current and illumination efficiency for the plasma display device of Shino.

But the Shino Patent, like the Iwasa Patent, is not cited in the Office Action with respect to the Setting Unit Feature of Applicant's claimed invention. In

addition, it is Applicant's contention that the Setting Unit Feature is not taught nor suggested in the Shino Patent.

The Setting Unit Feature of Applicant's claim 1 is similar to Applicant's cancelled claim 16. The basis for the Examiner's rejection of claim 16 was the Okuda Patent, but it is Applicant's contention that the Okuda Patent does not teach or suggest the Setting Unit Feature of Applicant's claimed invention.

Applicant notes that the Office Action only very briefly deals with the feature of cancelled claim 16. In this respect, the Office Action focuses on discharging of the electrical charge stored in the luminescent element of Okuda's driving system as shown in Figure 1. But it is Applicant's contention that the setting unit for setting a discharge time has defined in claim 1 relative to the discharge time Tx, the luminescence Lp, luminescence of emitted light Le, and discharge time Rt is simply no considered by the Okuda Patent. Simply put, the Okuda Patent does not teach or suggest the Setting Unit Feature of Applicant's claim 1.

Because the Setting Unit Feature is neither taught nor suggested in the Iwasa, Shino, and Okada Patents, the combination of these patents can neither teach nor suggest the display device of Applicant's claim 1, as well as dependent claims 2, 4, 11, 12 and 15.

Independent claim 5 is directed to a method of driving a display device and substantially includes the function of the Setting Unit Feature as discussed above. On that basis, Applicant respectfully submits that claim 5 and dependent claims 6-8, 9, 10, 13 and 14 are patentably distinguished from the Iwasa, Shino, and Okuda Patents.

Based on the foregoing remarks, Applicant respectfully submits that the Section 103(a) rejection should be withdrawn.

Newly Added Claims

By this Amendment, Applicant has added new claims 18-30. Claims 18-30 are similar to the above-discussed claims except that where the above-discussed

claims state "substantially no electrical charge", the newly added claims state "no electrical charge or almost no electrical charge". Applicant further notes that newly added claims 18-30 also recited or substantially recite the Setting Unit Feature as discussed above. Therefore, new claims 18-30 are likewise patentably distinguished from the references of record.

In view of the foregoing remarks and amendments, Applicant respectfully submits that claims 1, 2, 4-15 and 18-30 are in condition for allowance. Reconsideration and allowance of all pending claims are respectfully requested.

Respectfully submitted,

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Enclosures: Version With Markings to Show Changes Made

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May 1, 2003 Daniel N. Calder

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS:

Claims 16 and 17 have been cancelled.

Claims 18-30 have been newly added.

1. (Amended) A display device comprising:

a plurality of cathode wires,

a plurality of anode wires arranged in a matrix shape together with said plurality of cathode wires,

electroluminescence (EL) elements disposed between said plurality of cathode wires and anode wires, and in which an electrical charge is stored,

a current source coupled to said anode wires,

a voltage source coupled to said cathode wires,

an anode control circuit connected between said anode wires and said current source, for discharging said stored charge from said EL elements, and for controlling respective current flow into said anode wires,

a cathode control circuit connected between said cathode wires and said voltage source, for discharging said stored charge from said EL elements, and for controlling respective voltages at said cathode wires,

a display controller for controlling said anode control circuit and said cathode control circuit, said display controller including a setting unit for setting a discharge time for ~~which said stored charge is discharged from~~ discharging said stored charge of said EL elements before light emission of said EL elements~~.~~ to a time Rt,

wherein a discharge time Tx for discharging said stored charge before light emission of said EL elements is determined so as to obtain a luminance Lp of said EL elements determined by:

Lp ≥0.9 x Le,

where Le is a luminance of light emitted by said EL elements storing substantially no electrical charge, and said discharge time Rt satisfies the relation of:

$$Tx \leq Rt.$$

4. (Amended) The display device of claim ~~16~~1, wherein the discharge time Rt is set to satisfy the relation of

Rt ≤ B x Tx (where 1 < B < 10).

~~where Rt is the discharge time of actual discharge, and Tx is the discharge time.~~

5. (Amended) A method of driving a display device, said method comprising the steps of:

providing a display device having a plurality of cathode wires, a plurality of anode wires arranged in a matrix shape together with said plurality of cathode wires, and electroluminescence (EL) elements disposed between said plurality of cathode wires and anode wires, ~~and~~ wherein an electrical charge is stored in said EL elements,

discharging said stored charge from said EL elements before light emission of the EL elements,

controlling respective current flow into said anode wires,

controlling respective voltages at said cathode wires, and

setting a discharge time for which said stored charge is discharged from said EL elements before light emission of said EL elements~~:~~ to a time Rt,

wherein a discharge time Tx for discharging said stored charge before light emission of said EL elements is determined so as to obtain a luminance Lp of said EL elements determined by:

Lp ≥ 0.9 x Le,

where Le is a luminance of light emitted by said EL elements storing substantially no electrical charge, and said discharge time Rt satisfies the relation of:

Tx ≤ Rt.

6. (Amended) The ~~driving~~ method of ~~the display device of~~ claim 5, wherein the discharge time Rt is set to satisfy the relation of

Rt ≤ B x Tx (where 1 < B < 10).

~~where Rt is the discharge time of actual discharge, and Tx is the discharge time.~~

7. (Amended) The display device of claim 1, wherein Tf is the rise time of an El element accumulating the charge sufficiently, and Te is the rise time of an El element having no charge accumulated in the El element or almost no charge accumulated, being in the relation of

Tp = K x (Tf – Te) + Te (where 0 < K < 0.5)

and the rise time Tp to satisfy this relation is determined, and further supposing the discharge time corresponding to said rise time Tp to be Ty, and ~~the discharge time of actual discharge to be Rt,~~ the discharge time Rt is set to satisfy the relation of

Ty ≤ Rt.

8. (Amended) The display device of claim 7, wherein the discharge time Rt is set so satisfy the relation of

Rt ≤ B x Ty (where 1 < B < 10)

~~where Rt is the discharge time of actual discharge, and Ty is the discharge time~~.

9. (Amended) The method of ~~driving a display device according to~~ claim 5, wherein Tf is the rise time of said EL elements accumulating the charge

sufficiently ~~in said EL elements~~, and Te is the rise time of said EL elements having no charge accumulated in elements or almost no charge accumulated, and the rise time Tp is determined by the relation

$$Tp = K \times (Tf - Te) + Te \text{ (where } 0 < K < 0.5)$$

and the discharge time corresponding to said rise time Tp is Ty, and ~~the discharge time of actual discharge is Rt, then~~ the discharge time Rt is set to satisfy the relation of

$$Ty \leq Rt.$$

10. (Amended) The ~~driving~~ method ~~of display device~~ of claim 9, wherein the discharge time Rt is set ~~so~~ to satisfy the relation of

$$Rt \leq B \times Ty \text{ (where } 1 < B < 10).$$

~~where Rt is the discharge time of actual discharge, and Ty is the discharge time.~~

11. (Amended) The display device of claim 1, wherein supposing the maximum value of the discharge current value flowing by discharge of said accumulated charge to be Ip, the time required for the discharge current to reach the discharge current value Id to satisfy

$$Id = D \times Ip \quad \text{(where } 0 < D < 0.3)$$

to be Tz, and ~~the actual discharge time to be Rt,~~ the discharge time Rt is set to satisfy the relation of

$$Tz \leq Rt.$$

12. (Amended) The display device of claim 11, wherein the discharge time Rt is set to satisfy the relation of

$$Rt \leq B \times Tz \text{ (where } 1 < B < 10)$$

~~where Rt is the discharge time of actual discharge, and Tz is the discharge time~~.

13. (Amended) The method of ~~driving a display device according to~~ claim

5, wherein with the maximum value of the discharge current value flowing by discharge of said accumulated charge being Ip, and the time required for the discharge current to reach the discharge current value Id to satisfy

$$Id = D \times Ip \quad (\text{where } 0 < D < 0.3)$$

being Tz, and ~~the actual discharge time being Rt,~~ the discharge time Rt is set to satisfy the relation of

$$Tz \leq Rt.$$

14. (Amended) The ~~driving~~ method of ~~display device of~~ claim 13, wherein the discharge time Rt is set ~~so~~ to satisfy the relation of

$$Rt \leq B \times Tz \text{ (where } 1 < B < 10)$$

~~where Rt is the discharge time of actual discharge, and Tz is the discharge time~~.